The souls of seeds

Chapter 9

The Souls of Seeds

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Leibniz's pre-established harmonious unfolding of individuals' essences is rightly granted a pivotal role in his metaphysics. Most commonly understood in terms of the unfolding of monadic sequences of perceptions and appetitions, the closely related theories of organic-body preformation and the unfolding into visibility of plants and animals from their seeds have until recently largely been ignored.[2] In this paper, we question why, despite the thoroughgoing mechanical preformation of organic bodies, Leibniz insisted that the preformed seeds of animals and other living things must contain souls, entelechies or substantial forms. The issue is raised through contrast with Malebranche's doctrine of preformation that makes no such claim.

1. Introduction

Leibniz made no secret of his support for Descartes' modernising mission to expose the scholastic misconception that souls, substantial forms or entelechies and their perceptions and appetitions have any explanatory value within the physical sciences. In true Cartesian spirit, he insisted that physical mechanisms are "sufficient to produce the organic bodies of animals" (Preface to the *Theodicy,* H 64; GP VI, 40). At the same time, however, he also believed that the generation of organic bodies must be supplemented by "the *pre-formation* already completely organic in the seeds

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[1] With grateful thanks to the organizer, Adrian Nita, and to the participants of the *Oltenia Colloquium in Early Modern Philosophy* at which this paper was first presented in draft.
[2] For an extended discussion of Leibniz's theory and its historical context, see Smith (2011, 165-196). The topic has also been addressed by Duchesneau (2010) and by Wilson (1997).

of the bodies that come into existence, contained in those of the bodies whence they spring, right back to the primary seeds" (*ibid*.). Furthermore, Leibniz insisted that *all* preformed seeds, whether original or primary seeds or subsequent seeds,[3] contain souls. Yet, it is clear that Leibniz regarded preformation as applying only to the organic body and not to the whole corporeal substance comprising the organic body together with its dominant soul or substantial form. Hence, in the Preface to the *Theodicy*, he described preformation as "completely organic in the seeds" and later, in the text itself, he would refer to "this great number of souls and of animals, or at least of living organic bodies which are in the seeds", and explain that only the organic bodies of souls that are "destined to attain one day to human nature" are already "preformed and predisposed to assume one day the human shape" (*Theodicy*, §397; H 361; GP VI, 352). The organic bodies of "other small animals or seminal living beings" are also preformed, although, destined never to become the bodies of human beings, their bodies will accordingly only ever assume non-human shapes (*ibid*.). However, if preformation and mechanism suffice to explain the various successive states of the organic bodies of creatures, why did Leibniz consider it important in that context to highlight the fact that their seeds contain souls? Unless the fact of souls in seeds is a mere coincidence, their presence requires justification.

Leibniz's claim relies on two assumptions, neither of which is self-evidently necessary. First, Leibniz had supposed that all organic bodies are living bodies and second, that all living bodies are ensouled. Among his contemporaries, neither assumption enjoyed universal acceptance. Anne Conway felt no compulsion to endorse the first. She used the term 'organic' to refer to any object with parts arranged in an organised and functional manner. Thus, for Conway, a lifeless clock, even though it has no "vital principle of motion in it" is "simply an organic body".[4] Meanwhile, Malebranche denied the second assumption. He believed that all preformed bodies, though they are living bodies, should be regarded as in*anima*te or *soul*-less mechanisms. Lacking feeling, perception or desire, Malebranche's preformed seeds and other living bodies are therefore far closer in kind to inorganic physical objects, such as mountains, rocks and Conway's clock, than they are to

[3] Leibniz believed that God created all souls and organic bodies at once. Hence seeds are not primary in the sense of being created first, before others. Rather, at the moment of Creation, all seeds were 'primary seeds'. The phrase 'primary seeds' presumably refers to the initial states of seeds, that is, to seeds as they were when first created. Correspondingly, non-primary or subsequent seeds can be understood as seeds in their post-creation developed states.

[4] Conway (1996, 64).

living, sensing human beings whose minds or souls God fills with the sensations of colour, taste, touch, sound and smell that enable them to perceive physical objects in the external world. Malebranche appealed solely to the seed's preformation to ensure that everything is in place to allow that its future states are unfolded sequentially simply by the natural motions and collisions of bodies in accordance with the regular laws of motion. Given Leibniz's agreement on this point,[5] the question is raised: if Malebranche's preformation doctrine does not require that seeds possess souls, why should Leibniz's?

2. Malebranche's Preformationism

Malebranche had proposed that the preformation of bodies together with the mechanical laws of nature could account for the future unfolding of living animals and plants from seeds contained in the very first members of each species created by God at the beginning of the world. A single seed contains the seeds that will become its immediate offspring as well as the seeds of all the offspring that will be produced from that line down the years forevermore. All whose lineage will later be traceable back to the first parent are already present in seed-form in that first parent's seeds: "each seed contains the entire species it can conserve" (*Dialogues on Metaphysics and on Religion*, Dialogue X; DMR 175; R-L II, 852). For instance, "in a single apple seed there are apple trees, apples, and apple seeds, standing in the proportion of a fully grown tree to the tree in its seed, for an infinite, or nearly infinite number of centuries" (*Search After Truth*, LO 27; R-L I, 57).

The role of nature (or mechanism) is merely,

> to unfold these tiny trees by providing perceptible growth [*un accroissement sensible*] for that outside its seed, and imperceptible yet very real growth in proportion to their size, for those thought to be in their seed – for it cannot be doubted that there are bodies sufficiently small to get in between the fibers of these trees thought to be in their seed and thus to serve as food for them (*ibid*.).

[5] Leibniz's Fifth letter to Clarke, ALC 93, GP VII, 417-18.

The process may involve some re-configuration or re-shaping of the parts or organs of the seeds,[6] by which Malebranche meant that the relations and proportions among the pre-existing parts in the seeds might not be exactly the same as those in the resulting plant or animal. The parts of the bee, for instance, will not have "the same proportion of size, solidity, and configuration between its parts" when it exists in the larva as it will do after it has emerged as a fully-grown bee. Similarly, a chicken's head "when it is in the egg and appears in the form of larvae, is much larger than all the rest of the body, and … the bones assume their consistency only after the other parts" (*Dialogues on Metaphysics and on Religion,* Dialogue XI, DMR 195; R-L II, 873).

From this stance, there is no need for non-human animals, plants and their parts, including their seeds, to be endowed with sensing souls. They are simply mechanical machines. On Malebranche's thoroughly Cartesian account, "all the parts of animals are merely mechanical, and … they can be moved without a soul merely by the impression of objects and by their particular constitution" (*Search After Truth*, LO 324; R-L I, 469).[7] The process of unfolding what is already present in miniature in the seed involves only mechanical growth or augmentation. The accumulation of additional matter simply enlarges, while motion re-configures, parts or organs that are already present in miniature. All living things that will appear in due course, from tulips and frogs to the bodies of human beings, already exist in the seeds of their progenitors as tiny versions of their future selves.

> An entire tulip is seen in the seed of a tulip bulb. Likewise, a chicken that is perhaps entirely formed is seen in the seed of a fresh egg that has not been hatched.[8] Frogs are to be seen in frogs' eggs, and still other animals will be seen in their seed when we have sufficient skill and experience to discover them.[9] … We ought to accept, in addition, that the body of every man and beast born till the end of time was perhaps produced at the creation of the world (*Search After Truth*, LO 27; R-L I, 57).[10]

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[6] "Configuration", Malebranche defines as, "the shape of the unobservable parts of which large bodies are composed" (*Dialogues on Metaphysics and on Religion*, Dialogue X; DMR 181; R-L II, 859).
[7] See also, *Dialogues on Metaphysics and on Religion,* Dialogue XI DMR 195-96; R-L II, 874.
[8] Author note: "The germ of the egg is under a tiny white spot that is on the yolk. See the *Liv. de formatione pulli in ovo*, by Malpighi".
[9] Author note: "See *Miraculum naturae*, by Swammerdam".
[10] Similarly, of trees, that they exist ""in the seeds of their seeds in miniature" (*Search After Truth,* LO 26; R-L I, 56).

All that mechanism was required to do was to enlarge the organs and perhaps re-arrange the organs of the miniature animalcular figure in the seed. Extended matter in motion was considered quite sufficient to enable nature to fulfil its role of unfolding through augmentation and re-configuration what was already contained in the seed.[11] Nothing more is needed. Animal and plant souls, on the Malebranchean model, are redundant.[12]

3. Leibniz's Malebranchianism

There are indications of a Malebranchian-style animalculism in Leibniz's accounts of preformation also. For instance, Leibniz likened the never-ending, nested structure of organic living bodies to the layers of clothes on Harlequin:

> the machines of nature are as imperishable as souls themselves, and the animal together with its soul persists for ever. I can explain my meaning better with the help of a pleasant though very silly example: it is as if someone tried to strip Harlequin on the stage but could never finish the task because he had on so many costumes, one on top of the other (*New Essays*, A VI, 6, 328; RB 328).

Leibniz also employed Malebranche's language of "growth" or "augmentation" to describe the unfolding of the animal or plant that already exists "in miniature" in the preformed seed. The early microscopists had uncovered a previously hidden world of miniscule creatures in all manner of everyday substances from dung to chalk and Leibniz, following Malebranche,[13] appealed to their investigations to support his claims that "the apparent generation of a new plant or new animal is only a growth (*un accroissement*) and transformation of a plant or animal which already subsists in

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[11] See Dialo*gues on Metaphysics and on Religion*, Dialogue X (DMR 188-89; R-L II 866-67) for Malebranche's account of how the motion of matter fashions the parts in the seeds into the organised bodies of humans, animals and plants.

[12] Malebranche offered various negative reasons to support his denial of animal souls, among them being the avoidance of divine injustice. Regarding all pain or suffering as God's way of punishing sinful behaviour, recognising that any feeling creature will at times experience pain, and assuming that animals are innocent creatures, we can be assured that an "infinitely just and omnipotent God" will not provide animals with souls that enable them to be sensible of their circumstances (*Search After Truth*, LO 323; R-L I, 467).

[13] For instance, *Search After Truth*, LO 26; R-L I, 56. Malebranche's writings display an impressive awareness and understanding of contemporary scientific studies of the natural world. Wilson (1997: 158) suggests that it was his reading Malebranche's *Search After Truth* that led Leibniz to appreciate the metaphysical import of microscopy.

the seeds" (Leibniz to Sophie, 6 February 1706, Strickland (2011, 348), GP VII, 568); that "living animals as well as plants already exist in miniature (*en petit*) in the seeds before conception" (*Considerations on the Principles of Life and on Plastic Natures,* GP VI, 543; L 589); and that "death, like generation, is only the transformation of the same animal, which is sometimes augmented and sometimes diminished" (*ibid*.).

Given Malebranche's use of the microscopists' observations, Leibniz's appeals to those whom he considered the "best observers of our time" (Jan Swammerdam, Marcello Malpighi and Antonie van Leeuwenhoek)[14] afforded him the opportunity to align his preformationism explicitly and in public to that of the Oratorian. In the *New System of the Nature and Communication of Substances*, published in 1695, and again in the *Essays on Theodicy*, published in 1710, he numbered Malebranche amongst from whom he garnered support. Claiming that "the *transformations* of Swammerdam, Malpighi, and Leeuwenhoek … have made it easier for me to admit that animals and all other organized substances have no beginning … and that their apparent generation is only a development, a kind of augmentation", he immediately added that he had also "noticed that the author of the *Search After Truth*, Régis, Hartsoeker and other able persons have held opinions not far removed from this" (*New System*, GP IV, 480; AG 140). Fifteen years later, Leibniz once again alluded publicly to the support for his views from Malebranche in conjunction with others, including the microscopists:

> It is thus my belief that those souls which one day shall be human souls, like those of other species, have been in the seed, and in the progenitors as far back as Adam, and have consequently existed since the beginning of things, always in a kind of organic body. On this point it seems that M. Swammerdam, Father Malebranche, M. Bayle, Mr. Pitcairne, M. Hartsoeker and numerous other very able persons share my opinion. This doctrine is also sufficiently confirmed by the microscope observations of M. Leeuwenhoek and other good observers (*Theodicy*, §91; GP VI, 152; H 172).

While technically accurate, Leibniz's attempt in the *Theodicy* to situate himself amongst Malebranche and other well-respected figures can easily breed misunderstanding if not read entirely literally. For though it is true that Malebranche

[14] *New System*, GP IV 480; AG 140. Leibniz favoured Leeuwenhoek's animalist position; Malebranche, the ovism of Malpighi and Swammerdam. See DMR 175, n6.

admitted human souls, the alignment with Leibniz breaks down as soon as we go beyond these to consider the possibility of non-human souls in plants and animals. These, Malebranche firmly denied and, unlike Leibniz, Malebranche never appealed to the microscopic evidence to support such an opinion.[15] We find that the association with Malebranche is further undermined when we attend more closely to Leibniz's choice of terminology, first with respect to the changes that occur in organic bodies and, second, with regard to the changes undergone by the animals and other living beings to which these bodies belong. Leibniz described the former as mere 'preformations', while for the latter, he reserved the more dramatic term: 'transformations'.

4. Preformation *versus* Transformation

Leibniz took great care to distinguish preformation and transformation. Preformation was attributed to the organic body or seed, but transformation or metamorphosis was attributed solely to the animal. Animals or corporeal substances are *trans*formed; organic bodies or seeds are only *pre*formed. The difference was stated most clearly at *Monadology* §74:

> … today, when exact inquiries on plants, insects, and animals have shown us that organic bodies in nature are never produced from chaos or putrefaction, but always through seeds in which there is, no doubt, some *preformation,* it has been judged that, not only the organic body was already there before conception, but there was also a soul in this body; in brief, the animal itself was there, and through conception this animal was merely prepared for a great transformation**,** in order to become an animal of another kind. Something similar is seen outside generation, as when worms become flies, and caterpillars become butterflies (sec. 86, 89; Preface ***5.b. ff; sec. 90, 187, 188, 403, 86, 397) (*Monadology,* §74, GP VI, 619-20; AG 222).[16]

[15] For all Leibniz's protestations, on this point, the scientific evidence must be silent. No empirical confirmation of the presence of immaterial perceiving souls in animals or in their seeds can be provided solely by the observation of their physical bodies.
[16] See also, *Principles of Nature and Grace,* §6; GP VI, 601; AG 209.

The transformations described here involve changes of the animal's bodily shape that are so radical that the animal, post-transformation, may be regarded as belonging to a different species. The transformed animal becomes "an animal of another kind". Among the appended references to the *Theodicy*, Leibniz directs us to one we have already had occasion to mention, *Theodicy* §397. There, Leibniz had written of souls whose organic bodies are "preformed and predisposed *to assume one day the human shape*", distinguishing these bodies from "the other small animals or seminal living beings, in which no such thing is pre-established" (*Theodicy* §397; GP VI, 352; H 361; my emphasis). Even Leibniz's homuncular-sounding example of the multi--layered Harlequin was qualified in keeping with the notion that preformed bodies can change dramatically change their shape, for Leibniz went on in the *New Essays* passage quoted earlier to explain that we should not conceive the tiny bodies within larger bodies as exact replicas of the latter. "Nature's artifice" is not so crude. What is replicated in the smaller regions of the organic body does not exactly resemble the original:

> the infinity of replications of its organic body which an animal contains are not as alike as suits of clothes, and nor are they arranged one on top of another, since nature's artifice is of an entirely different order of subtlety (*New Essays*, A VI, 6, 328; RB 328).

From the observation that some souls will one day possess bodies that assume the figures of creatures belonging to different species, we may infer that Leibniz intended that the transformation of an animal be understood, not as a simple "augmentation" in the Malebranchian sense of merely becoming bigger, but rather as a process through which the creature acquires a new outward appearance. When a body takes on the shape of a human being, there is a real transformation of the *animal* (the body together with a soul) as its body assumes a shape typical of members of an altogether different species. The body acquires a new shape; it does not simply re-configure and increase in size (augment) the organs that the body already possessed in miniature.[17]

[17] Although the issue is of course highly relevant, I will not divert our attention here to the methods of species classification preferred by Leibniz and contrasted in the *New Essays* with Locke's thoroughgoing nominalism. For discussion of Leibniz on the classification of biological species, see Smith (2011, 235-274).

Augmentation as growth or nourishment is of course still required in addition to transformation. Ordinarily, Leibniz referred to 'transformations' as 'developments', as when he stated that 'generation is thus merely the growth of a changed (*transformé*) and developed (*developpé*) animal' (*Reflections on the doctrine of a single universal spirit*, GP VI, 534; L 557). The development of the animal (its transformation) goes hand in hand with its growth (or augmentation). Nevertheless, the two procedures are not one and the same. Elsewhere, Leibniz described the generation of the animal as a transformation *and* a "kind of augmentation" (*New System*, GP IV, 480; AG 140). The unfolding of the animal as a creature of another species is a sophisticated growth, nourishment or augmentation combined with transformation or development. The distinction and combination of transformation with augmentation or growth is also evident in the passage cited earlier from his 6 February letter to Sophie, in which Leibniz had declared that "the apparent generation of a new plant or new animal is only a growth and transformation of a plant or animal which already subsists in the seeds" (Strickland (2011, 348), GP VII, 568). It is evident too in Leibniz's remark in the *Reflections on the doctrine of a single universal spirit* that "seeds already contain the formed plant or animal, although it still needs transformation and nourishment, or growth (*accroissement*), to become an animal of the kind which our ordinary senses can observe" (GP VI, 534; L 557).[18]

In sharp contrast, Malebranche never embellished his theory of preformation as augmentation with a theory of the transformation of the animal. Instead, Malebranche insisted upon understanding the so-called transformations from larvae into fully-fledged flies and butterflies as simple augmentations. When, in the *Dialogues on Metaphysics and on Religion*, Theotimus claims, incorrectly as it turns out, that the Ant-Lion or "*Formica-leo"* transforms itself into a dragonfly, Malebranche's mouthpiece, Theodore, ridicules the idea, likening it to the idea of a mole being turned into a blackbird. An animal of one type cannot be transformed into an animal of a different kind.[19] Indeed, Malebranche thought that generation via different species would require that God intervene in particular instances, acting by particular volitions rather than relying on the general or universal operation of the

[18] In the *Considerations on the Principles of Life and on Plastic Natures*, Leibniz described death and generation as "only the transformation of the same animal, which is sometimes augmented and sometimes diminished" (GP VI, 543; L 589). This can be read as claiming either that the transformation itself is subjected to augmentation or that it is the transformed animal that is augmented. In either case, however, transformation is presented as something more than mere augmentation.

[19] *Dialogues on Metaphysics and on Religion*, Dialogue XI; R-L I, 878; DMR 200.

laws of motion to generate new life. To believe otherwise, he claimed, would denigrate God's intelligence: "[f]or to suppose that God ordained some intellect … to maintain the species and from it always to form new ones, is to render divine providence human, and make it bear the character of a limited intelligence" (*Dialogues on Metaphysics and on Religion*, Dialogue XI; R-L II, 879; DMR 201).[20]

However, Malebranche contended, the mechanical generation of new creatures within the same species *is* possible so long as the arrangement of the infinity or organs is pre-formed in advance by God in such a way that every creature contains the seeds of all its progeny for evermore. As we have seen, all that is then required to pave the path to adulthood is growth or nourishment through the accretion of matter and re-configuration, through motion, of the organs. Bees provide the paradigm case:

> all the organic [*organiques*] parts of bees are formed in their larvae, and are so well proportioned to the laws of motion that they can grow [*peuvent croître*] through their own construction and through the efficacy of these laws, and can assume the shape suitable to their condition, without God intervening anew through extraordinary providence (*ibid*. R-L II, 874; DMR 195-96).[21]

Nevertheless, the universal operation of the general laws of motion is useful only in blindly and deterministically re-configuring and augmenting organs that are already *in situ*. They cannot effect the initial creation and organisation of the infinity of parts of each and every creature that will ever exist: "the general laws of the communication of motion are too simple to construct organic bodies [*des corps organisés*]" (*ibid*., R-L II, 873; DMR 195). Consequently, whatever is not literally in the seeds at the beginning cannot arise later through the mere mechanical laws of nature:

> if these tiny embryos, or rather these embryos of embryos of embryos, and so on, did not have a crystalline lens, for example, or optic nerve, or the leading block I

[20] See also R-L II, 881; DMR 203.

[21] Malebranche also appealed to God's strict application of the universal laws of motion and His refusal to intervene in particular instances in order to account for the frequent occurrences of "monstrous animals" (DMR 196, R-L II, 874). See also *Search After Truth* (R-L I, 183; LO 118) where God's adherence to the criteria of simplicity, continuity, and order are highlighted: "having had a plan to produce an admirable work by the simplest means, and to link all His creatures with one another, He foresaw certain effects that would necessarily follow from the order and nature of things". That this would sometimes give rise to monstrous births in humans and other living things "did not deter Him from his plan".

> discussed,[22] or the first rudiments of all those parts destined to the same end, it is clear that the general laws of motion would never have been able to construct them. (*Search After Truth*, Last Elucidation – Elucidation on Optics, R-L I, 1099; LO 741-42)[23]

On the inability of matter to construct organised bodies with infinitely many parts and the need to introduce initial divine preformation, Leibniz was in complete agreement with Malebranche. He agreed wholeheartedly that preformation is a necessity because "there is no mechanism which is able to draw from an unformed mass a body endowed with an infinite number of organs, such as is that of an animal" (Leibniz to Sophie, 6 February 1706, Strickland 2011, 348, GP VII, 568). And even though Leibniz allowed species-changing transformations, he also agreed that matter operating solely by the laws of motion was sufficient to bring about the unfolding of the animals' preformed organic bodies. For Leibniz, the preformed changes to the organic body needed to accomplish the transformation of the animal are produced by purely mechanical means. As he told Samuel Clarke:

> The organism of animals is a mechanism which supposes a divine preformation: what follows from it, is purely natural, and wholly mechanical (Leibniz's Fifth letter to Clarke, GP VII, 417-18; Alexander 93).

Divine preformation sets the original conditions. For Malebranche, these constitute in miniature the body that will eventually emerge. Having rejected transformations, Malebranche proposed that seeds and eggs contain all that they need and do not take in nourishment from outside until they are ready to hatch and to grow full maturity.[24] Anything less than the complete formation of the creature in miniature in the seed would require God's particular volitional intervention over and above the general operation of the laws of motion. However, there seems in principle no reason why

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[22] See *Search After Truth,* R-L I, 1070-71; LO 723.

[23] See also, *Dialogues on Metaphysics and on Religion*, Dialogue XI; R-L II, 884; DMR 205.

[24] "The silkworm is nourished by the leaves of the mulberry tree, but the tiny worm contained in the egg is nourished by nothing; it has everything it needs next to it. True, it does not always eat. But it conserves itself without eating, and for six thousand years has been conserving itself. We find it strange that certain animals spend the winter without nourishment. What a marvel it is, then, that silkworms organize their nourishment so exactly, that they lack it precisely only when they are strong enough to break out of their prison and when the mulberry trees have spouted tender leaves to nourish them anew" (*Dialogues on Metaphysics and on Religion*, Dialogue XI, R-L I, 881; LO 202).

God's particular volitions should be required in order that animals and plants might be, not merely augmented, but actually transformed into creatures of a different species. There is no need, as Malebranche would have it, to limit God's intelligence or to require His miraculous intervention from time to time. Could not God simply preform seeds in such a way that shapes different from the one originally bestowed might come about over time through interactions with external things? Divine omniscience, foreseeing all the motions and interactions of bodies, would surely know exactly which initial states (that is, which primary seeds) were needed in order that they should assume their different species shapes in due course. The crystalline lens need not present fully formed from the beginning. It can emerge through (internal and external) mechanical processes over time. The primary seeds are not required to have everything they need from the very beginning; they can acquire what they need over time, through mechanical interactions with others. Once preformed, mechanism alone could bring about all the changes required in individuals' organic bodies, even those radical changes of bodily shape that result in their changing species membership.

However, if the laws of mechanics do suffice to maintain the functions of reproduction, nutrition and self-repair and even to bring about the requisite changes of shape and structure of the organic body, if everything in nature does simply unfold through mechanical collisions and motion, then we still lack justification of Leibniz's claim that preformation requires that seeds and other organic bodies possess souls. Malebranche and Leibniz agreed that preformation together with mechanism is sufficient to produce the organic bodies of animals. Malebranche did not attribute souls to seeds. The question remains, why should Leibniz?

5. Transformations, Continuity and Identity

In itself, the doctrine preformation itself seems unable to justify Leibniz's attribution of souls to preformed seeds. Might the animal transformations brought about by changes to their preformed bodies fare better? Certainly, all transformations of living beings are dependent upon the preformations of their organic-bodies. No living thing can be transformed into a creature of a different species unless its organic body

assumes the shape typical of members of that species.[25] If animal transformations can be demonstrated to require the presence of souls, then at least in those cases where transformations occur, the preformed bodies, as the organic bodies of ensouled creatures, would also be shown to possess souls. And if *all* preformed bodies are organic bodies of transformed living creatures, we would have the foundation on which to build a case for the presence of souls in *all* seeds. Whether rightly or wrongly, Leibniz himself believed that transformations are not unusual occurrences. Those few that are observable are only visible instances of a process that is prevalent throughout the created world:

> nature has this tact and goodness in revealing its secrets to us in small samples and thus making us infer the rest, everything being in correspondence and harmony. It is this which nature shows us in the transformation of caterpillars and other insects, for flies too come from worms, to help us grasp that there are transformations everywhere (*Reflections on the doctrine of a single universal spirit*, GP VI, 533; L 557).

But do living things really need to possess souls if they are to undergo transformations? One might suppose that the soul is required to maintain the continuity of the species-changing animal over time. Certainly, Leibniz believed that the animal persists throughout the momentous changes precipitated by the altered shape of its body: "the animal itself will always remain throughout these transformations, just as the silkworm and the butterfly are one and the same animal" (*Reflections on the doctrine of a single universal spirit*: GP VI, 533; L 557). However, I have found no evidence of Leibniz arguing for the existence of the soul as a means of securing the continuous diachronic identity of the animal through species transformation. Indeed, his preference seems to have been to argue from the prior existence of the organic body to the existence of the soul and the animal itself, not from the pre-existence of the soul or ensouled animal to the existence of its organic body.[26]

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[25] In the *Principles of Nature and Grace*, Leibniz even inferred the transformation of the animal or plant from the preformation of the seed: "Modern investigations have taught us, and reason confirms it, that living things whose organs are known to us, that is, plants and animals, do not come from putrefaction or chaos, as the ancients believed, but from *preformed* seeds, and consequently, from the transformation of preexistent living beings" (§6, GP VI, 601; AG 209).

[26] *Monadology* §74, GP VI, 619.

In any case, arguing in favour of the soul as guarantor of the continuing identity of the animal through change may simply beg the question. After all, the outward appearance has utterly changed, so strictly speaking, the evidence suggests that the first animal has disappeared and has been replaced by another. Nevertheless, eager to *believe* that the same animal has persisted throughout, the temptation is great to propose a theory of transformation over replacement. When Descartes had suggested that the soft, transparent, melted wax by his fireside was the same as the hard, opaque object that had been at his fireside before the fire was lit, his assessment could not be based on empirical evidence, but had to depend upon his forming an intellectual judgement that begged the question whether the same object really did persist despite the changes in its outward appearance. Maintaining that the same animal persists through similarly radical changes to the shape, size and general appearance of its body is equally questionable. Just as Descartes lacked a watertight assurance that it really is the same wax, so too there is no full-proof evidence that the caterpillar is the same animal as the butterfly and the latter has not simply taken the place of the former.[27]

Such quibbles may be set aside, however, for Leibniz's approach was quite different. When commenting on Ralph Cudworth's theory of plastic natures in a paper published in the May 1705 issue of the *Histoire des Ouvrages des Savants*, Leibniz proposed that the organic body itself is indestructible, thus effectively avoiding the Cartesian problem of how to justify the continuing identity of the animal through the radical changes to its organic body. In that paper, Leibniz did not appeal to the presence of a unifying soul in order to secure the sameness of the animal whose body is in constant flux. Instead, he proposed that the organic body itself remains the same throughout. Its composition or structure alone guarantees its physical indestructibility and ensures its identity even through radical and species-altering changes of shape. Living bodies – here described as "mechanisms of nature" -- have

[27] Besides this, many common alterations to bodies are not judged to be transformations of an *animal* from one species to another. Wine turns into vinegar, milk into cheese. Why should we consider the change from caterpillar to butterfly as anything more than the ordinary changes that happen to inanimate masses? One response is to highlight the generative capacities of living things. Wine turns into vinegar, but vinegar never becomes wine. Caterpillars, on the other hand, become butterflies and butterflies then produce the larvae of future caterpillars, completing the natural cycle of the birth and death of living things. On the self-sustaining and self-reproducing abilities of living things, see Smith (2011, 70-72). Generally, biological reproduction is effected through the production of seeds or eggs. This too, however, begs the question as to whether seeds and other means of generative replication are rightly regarded as signs of life and the presence of souls.

an infinite number of parts, each of which is itself a mechanism with infinite parts.[28] Nature's mechanisms are indestructible *because* their mechanical structure proceeds to the infinitely small:

> since the mechanisms of nature are mechanisms down to their smallest parts, they are indestructible, since smaller machines are enfolded in greater machines into infinity (*Considerations on Vital Principles and Plastic Natures*, GP VI, 543; L 589).[29]

Leibniz's Harlequin example discussed earlier traced a similar line of thought:

> the machines of nature are as imperishable as souls themselves, and the animal together with its soul persists for ever. I can explain my meaning better with the help of a pleasant though very silly example: it is as if someone tried to strip Harlequin on the stage but could never finish the task because he had on so many costumes, one on top of the other (*New Essays*, A VI, 6, 328; RB 328).

Putting to one side the multiplicity of questions and difficulties associated with this justification of corporeal indestructibility on account of their infinitely enfolded structures,[30] it is clear that Leibniz himself believed that bodies' infinitely nested structures are sufficient to guarantee that one can never completely destroy an organic body for one could never completely destroy all of its (infinitely many) versions. However, if the organic body is in itself indestructible and remains the *same* through the change from seed to plant or animal and beyond, there would seem to be no need for each and every organic body also to be endowed with its own dominant soul nor any reason why the organic body should belong to a transformed animal. The

[28] For Leibniz, the infinitely divided nature of the body of the corporeal substance identifies it as a living body and marks the distinctive difference between machines of divine construction and those made by mere humans that have only a finite number of parts. For discussion, see Nachtomy (2011).

[29] Having earlier in the paper asserted his belief in the existence and immortality of the soul, Leibniz continued: "Thus, one finds himself forced to maintain at the same time both the pre-existence of the soul with that of the animal and also the subsistence of the animal with that of the soul" (GP VI, 543; L 589).

[30] The notion sits uneasily beside Leibniz's more usual stance whereby composite bodies, because they are composite, are naturally destructible (e.g. *Monadology* §6, GP VI, 607; AG 213). Moreover, the animate machine or living organic body is in constant flux, with parts leaving and others arriving at every moment. There is no inherent unity among them. If it is said that the animate body does possess a unity that persists despite the flux of its parts, this implicitly re-introduces the soul as the source of that unity, contrary to Leibniz's reasoning here. If, as is implied here, indestructibility is due to the similarity of the infinitely enfolded parts, a non-Leibnizian animalculism is indicated, while if the parts are not exactly the same and change of species can occur, the continuing identity of the animal (and hence also its indestructibility) is assumed, not proven.

diachronic identity of the body has been secured by appeal to its internal composition and, other than support for the belief that each organic body is the body of a perceiving, appetitive living being – a fact that we can be certain of only in our own case [31] – the attribution of souls to non-human organic bodies has nothing to contribute. Non-human animals, plants and other living creatures might indeed, as Malebranche believed, be nothing more than infinitely complex soul-less machines.

6. Souls, preformation and causation

Up to now, we have found no reason within Leibniz's accounts of animal transformations or the bodily preformations on which they depend to support Leibniz against the Malebranchean threat of soul-less seeds and living bodies. In this last section, however, we examine a powerful argument based on the nature of matter and its mechanical operation that sheds light on why Leibniz believed that the unfolding of preformed bodies – and hence also by extension the pre-established successive transformations of animals and plants – presupposes and depends upon their possessing perceiving, indivisible souls. Preformed matter can operate mechanically (by collisions), it will be argued, only if that matter is itself imbued throughout with souls. Consequently, as we shall see, the preformation-transformation relation is symbiotic: the transformation of the animal depends upon the preformation of its organic body, but equally, the unfolding of the preformed matter is dependent upon there being unified, en-souled and transformable creatures.

Preformed bodies, for both Malebranche and Leibniz, are composed of infinitely many, intricately organised part or organs. Such plurality of parts, Leibniz contended despite the argument discussed in the previous section, requires principles of unity, namely souls. Anticipating the iconic argument at the opening of the *Monadology*, he declared in the *New System* that,

> a simple mass of matter, however organized it may be … can only be considered as an army or a herd, or a pond full of fish, or like a watch composed of springs and

[31] Leibniz does argue elsewhere that we can extrapolate from our own experience to the probability that other creatures have experiences also. See Phemister (2004).

> wheels. Yet if there were no true *substantial unities,* there would be nothing substantial or real in the collection (*New System*, GP IV, 482; AG 142).

The argument is familiar. To avoid falling into the labyrinth of the composition of the material continuum and its regression of never-ending divisibility, it is necessary to postulate the existence of metaphysical atoms, substantial indivisible unities upon which divisible aggregate bodies can be founded. Souls or substantial forms are the means by which the requisite unity is introduced into aggregate bodies (*ibid*.). Bodily indestructibility notwithstanding, an aggregate is a unified organic body only when it is in possession of a dominant soul or substantial form.

With respect to preformed seeds, this establishes only that the parts from which the seed is composed must possess unifying souls if the seed is to be an aggregate body. As an aggregate, it must be constituted by or founded upon substantial unities. It does not determine whether the seed itself must also possess its own dominant soul that unifies the otherwise indestructible aggregate body nor does it establish any specific role for such a dominant soul in the preformation of the seed itself.

A crucial role for the soul is forthcoming, however. If successful, Leibniz's claims will demonstrate that matter, in order that it be preformed, must be imbued throughout with souls or their equivalents, entelechies or substantial forms and will put to rest the notion that Malebranchean soulless merely extended animal and plant bodies and seeds can be subjected to preformation. In a letter written in the spring of 1687, Leibniz suggested to Arnauld that it is only through the perceiving substance's "representation of the whole universe according to its point of view" and its gathering together of the "impressions (or rather relationships) which its body receives mediately or immediately from all others", that

> the lineaments [*les traits*] of the future are formed in advance and that the indications [*les traces*] of the past are preserved for ever in each thing, and that cause and effect adapt to one another precisely down to the detail of the smallest circumstance, although every effect depends upon an infinite number of causes and every cause has an infinite number of effects… (to Arnauld, 30 April 1687, GP II, 98; Mason 123).[32]

[32] I am indebted to Dr Jeremy Dunham for reminding me of this passage.

Nothing can be "formed in advance" and nothing can be preserved unless each organic body has a dominant soul, entelechy or substantial form, together with which it becomes a complete indivisible corporeal substance, for only the perceiving soul has the requisite unity that makes possible the complete representation in a single instant of past, present and future states of the universe in the animal itself. The soul is the immaterial point at which all preceding causes of the present effect converge. It acts both as the place-holder for an infinity of future effects and as the present locus of memories of an infinite number of past effects. And without the soul's complete representation by which the animal holds all the "lineaments of the future" in itself and preserves the "indications of the past", the animal's body would be unable to enter into causal relations with other bodies and thus would not be able to unfold in accordance with its preformation. In short, neither causation nor preformation would be possible if, as Malebranche and other Cartesians believed, "the essence of matter consisted of a certain shape, movement, or modified version of extension which was determined" (*ibid*., GP II, 98-99; Mason 123).

Leibniz offered a similar argument to the Electress Sophie. In his letter of 6 February 1706, he explained that the soul must not only receive the diverse impressions made on its body through interaction with others across the entire universe, but it must also "disentangle" (*demêler*) them.

> [N]ature alone in fact receives all impressions and brings them together into one, but without the soul the order of the impressions matter has received could not be disentangled, and the impressions would only be confused. Each assignable point of matter has a different motion from every other point assignable to it, and its motion is composed of all preceding impressions; but this impression is as simple as those which compose it, and no composition can be recognized in it (to Sophie, 6 February 1706; GP VII, 570; Strickland 350).

Each body, each portion of aggregate matter, is affected by all others. The infinitely many preceding impressions can be impressed only on an infinitely divided body, but in order for them to be effective both as causes of a creature's present and future states, these infinitely many impressions must be "disentangled" by the body's soul that holds them all together in a single moment. Without such disentanglement, "the impressions would only be confused". Presumably, then, the soul's disentanglement

consists in differentiation of the various impressions, some of which will be perceived more distinctly than others. As he went on to explain, even though all past impressions are causally efficacious in bringing about the creature's current state of being and all must be represented in its soul's perceptions (for "the entire effect must always express its cause"), it is only "where the preceding impressions are distinguished and preserved" that the soul is present (*ibid*.).

To fully appreciate the importance of the soul's disentangling distinctions, we must return to Leibniz's 30 April 1687 letter to Arnauld. Leibniz began this letter by re-iterating the claim made in an earlier letter[33] that "the soul expresses more distinctly (all other things being equal) what pertains to its body" (GP II, 90; Mason 113). It is in this way that the soul perceives the rest of the universe by means of its body's sense organs, distinctly perceiving the effects made on its own body by external bodies.[34] By disentangling the infinite multitude of impressions, perceiving some more distinctly than others, the soul is firmly situated 'in' its body. By perceiving more distinctly the impressions made on its own body and thereby perceiving the world through its sense organs, the organic body becomes the spatial location for the soul's unique point of view or perspectival representation of the universe.[35]

Keeping these points in mind, we are now in a better position to comprehend Leibniz's cryptic remarks to Sophie. Following on from his remarks cited above, he remarked, "It is true and very noteworthy that, by taking this point together with the matter which surrounds it, there is a way of disentangling the past" (to Sophie, 6 February 1706; GP VII 570; Strickland 350). The "point" in question is the soul as the unique "point of view" on the universe; the "matter which surrounds it" is the soul's organic body. In this "surrounding matter", he continued, are the "infinite varieties of shapes and motions … which preserve something of all preceding effects", all of which impressions are held united in the soul's perspectival perception. "[F]or this reason", he concluded, "every soul is accompanied by an organic body which corresponds to it" (*ibid*.). In short, the soul must have an infinitely divided body

[33] To Arnauld, 28 November/ 8 December 1686; GP II, 74; Mason 92.
[34] "[W]e perceive other bodies only through their relationship to ours" (to Arnauld, 9 October 1687; GP II, 113; Mason 145).
[35] Thus, Leibniz continued, although the soul expresses the whole universe, unless it perceives some things more distinctly than others, "there would be no distinction between souls" (to Arnauld 30 April 1687; GP II, 90; Mason 113).

capable of receiving the infinity of impressions made on it from outside. Correspondingly, since the effect must represent its entire cause, the organic body, if it is to be an effect of all these impressions, must be in possession of a soul that holds these myriad impressions as a single perceptual experience.

7. Conclusion

The remarkable theory outlined in the previous section has startling consequences for the very possibility of a mechanical philosophy styled on the Cartesian model. If indeed, a piece of matter or its motion cannot be the effect of any preceding cause unless it is able to contain in a single indivisible point, and to disentangle, the entirety of preceding impressions made by all past bodies, then no soul-less inanimate, divisible body, such as Malebranche and Descartes theorised, can be the effect of (can be affected by) any other body. If we accept Leibniz's conditions, then effects can be felt only in bodies that have dominant souls or substantial forms. When the soul collates the myriad impressions on its body and perceives some more distinctly than others, its body not only becomes the spatialised point from which the universe is perceived, it also becomes a particularised effect of the myriad causes that led to its current state of movement or resistance. Thus, when an aggregate of substances lacks a dominant soul – when it is a mere inanimate object – the effects on the body will be felt only in the constituent ensouled substances. Only when the body as a whole is an organic body dominated by its own soul is the whole body itself an effect of the preceding causes.

The implications for the possibility of Malebranchean preformed seeds are serious. Malebranche's soul-less seeds are composed entirely of equally soul-less organised parts. But if Leibniz's argument holds, then seeds can be preformed only if they contain the "lineaments of the future" and they can unfold their futures only if they are able to be "effects", that is to be affected by preceding causes. Thus, they must, as Leibniz has claimed, also preserve the "indications of the past". Neither is possible, Leibniz has argued, unless the seed possesses a dominant soul or substantial form. Moreover, both Leibniz and Malebranche held that each preformed seed has infinitely many parts. If the body as a whole is to be affected, each of these constituent parts must also be acted upon. But each part can be an effect only if has a

soul dominant over it and uniting the impressions it receives through each of its smaller parts. Hence, each preformed seed, contrary to what Malebranche believed, must contain an infinite number of souls or substantial forms, each dominant over its own particular part of the infinitely divided seed. Thus, souls really are in preformed seeds, one as dominant over the whole and each of the others dominant over one of the seed's myriad parts respectively.

Finally, we may note that, despite Malebranche's protestations against animal transformations, if each preformed seed must be the organic body of a living, ensouled, corporeal substance or animal-like living entity, then all preformed changes in the organic body are also transformations of the animal itself.[36] Neither the preformation of the organic body or seed with its infinitely many parts nor the various transformations of the animal to which this body belongs could take place in the absence of the unifying and collecting soul. Transformations of the animal depend upon the preformed changes to its organic body, but equally, the preformed changes in the organic body are dependent upon the presence of the dominant soul of the animal that is transformed by these preformed effects on its body.

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[36] Thus seeds are ensouled organic bodies, that is, they are the organic bodies of tiny corporeal substances waiting in the wings ready to unfold.

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